

2. During this time the parents fed the nestlings 2373 times.

3. The incubation period for *Dendroica aestiva* is eleven days.

4. The egg shells are disposed of by being devoured by the parents.

5. This species does not feed its young by regurgitation at any period.

6. Brooding is carried on only by the female.

7. Intensity of brooding is due to a complexity of factors, including nest location.

8. The brooding instinct can be modified by artificial environment.

9. During the first half of the nestling period, the excreta sac is usually devoured, and carried away during the latter half.

10. The excreta sac is either dropped to the ground or deposited on the limb of a tree.

11. The parent birds have a stereotyped approach to the nest.

*Sioux City, Iowa.*

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## SOME RECORDS OF THE FEEDING OF NESTLINGS.

BY LYNDS JONES.

During the summer of 1912 two students made a number of studies of the feeding of nestlings, summaries of which I herewith present. These studies were made without the aid of a blind, because it was found possible to approach within a few feet of the nests without disturbing the parent birds in their feeding activities. It was also found that the sex of the birds could be determined positively, after noting each bird for the first few hours. This was done by noting the individualities of the two birds, and by the frequent singing of the male, either just before or just after he delivered the food.

FIELD SPARROW (*Spizella pusilla pusilla*)—Four Young.

Only the last two days of the nest life were noted. The time spent with this pair was 19 hours and 12 minutes. During that time 237 pieces of food were delivered and 31 excreta removed. The shortest time between feedings was one minute and the longest 21 minutes, the average being 10 minutes between feedings. If each of the four young were fed in regular rotation each received food once in 40 minutes. There were 154 Geometrid larvæ (104 green, 37 brown, 13 white), 45 grasshoppers, 24 moths, 3 scattering, and 11 unknown. There was no regularity apparent, either of the intervals between feedings or of the sort of food secured as regards the time of day. All of the birds left the nest in the early morning, and apparently at the same time. It was not certainly determined that they were frightened away by a horse, but that is likely. The male was not seen to bring any food, but he secured some occasionally and delivered it to the female. The food was secured within a radius of 50 yards of the nest, mostly from the grass of the orchard, but occasionally from the apple trees. The bird always approached the nest from the same direction, usually alighting on the ground within three yards of the nest and proceeding directly to it by hopping along the ground and entering the bunch of grass in which the nest was built by means of a short tunnel. Her approach with food was heralded by a low chip, to which the young responded by stretching their necks up and opening the mouth. There seemed to be no method to the feeding to make certain that each young bird had a fair share, but all seemed to be equally well fed, judging from their appearance. Most of the excreta was eaten by the old bird. It was not allowed to soil the nest.

SONG SPARROW (*Melospiza melodia melodia*)—Four.

This nest was placed in a bunch of weeds beneath a Baldwin apple tree, within six inches of the ground. The old birds were sometimes disturbed by a flock of young chickens. The nest was under observation for the first three days after

the young hatched, and during the last three days that they spent in the nest — a total of 35 hours and 31 minutes. The female was less shy and was more attentive to the young, the male more shy and would leave the nest immediately after feeding. He had the habit of perching upon a limb near the nest and singing after each feeding. Neither bird made any sound on approaching the nest. The female did the most of the brooding of the young, spending the greater part of the time on the nest for the first three days. During this time the male brought the food and delivered it to the female, who delivered it to the young.

The male made 158 visits, the female 119 visits to the nest during the period of observation, or 277 by both birds. The male carried away 44 excreta, the female 31, or 75 by both birds. The excreta was sometimes eaten, sometimes fastened to the limb of a tree. 300 pieces of food were brought. Of these 178 were Geometrid larvæ, 46 grasshoppers, 11 bugs, 3 moths, 31 unknown, and 31 times nothing was brought. There were an average of eight feedings an hour. This is an average of one feeding every 30 minutes for each of the four young. There was no regularity in the time between visits to the nest at any time of day. The duration of absence seemed to be determined wholly by the ability of the birds to find food. They ranged rather farther than the Field Sparrows did, but seemed to find the bulk of the food in the grass.

#### HOUSE WREN (*Troglodytes ædon ædon*).

This nest was located when the birds first carried nest material into the woodpecker's hole in a sycamore post in the south-east corner of the orchard. The nest was near the top of the post, about four feet from the ground. The hole was on the north side of the post. A barbed wire was fastened to the post just below the nest hole, and below the barbed wire the fence was of woven wire. A corn field with the ears in full silk occupied the ground just south of the nest, the five-acre orchard of apple trees north-west, while two

rods to the east there was an oat stubble and the unoccupied part of a cemetery, from which the grass had just been cut for hay.

The birds finished the nest in a week, the eggs were laid in another week, incubation consumed eleven days, and the birds left the nest nine days after hatching. It was not possible to learn the number of young without breaking the nest open, which was not done. It was supposed that there were seven young. They were hatched early on the morning of July 22 and left the nest about ten o'clock on July 31.

This family was under observation 65 hours and 4 minutes. On three days the observations began before the awakening of the old birds. There were two days when no observations were made. There were 667 visits made to the nest, of which 560 were made by the male and 107 by the female. This great discrepancy is due to the fact that the female did not leave the nest much, but received the food from the male and fed the young herself. The male rarely entirely disappeared within the nest hole. Apparently the female left the nest only to obtain food for herself. No droppings were removed from the nest for the first three days, but must have been eaten by the female, since the nest was left clean.

The average number of visits per hour was a little better than 10. The approach to the nest was usually from the east, the birds alighting on the barbed wire within a few feet of the nest, and then flying out and darting into the nest hole, but many times there was no stop from the time the birds left the place where food was procured until they darted into the nest hole. The male almost invariably sang before and after visiting the nest, unless he flew directly in, and left without first perching on the fence. The food was mostly secured from the oat stubble and the cemetery, but some was found in the corn field, and only a little of it in the orchard.

There were 637 pieces of food brought, of which 161 were Geometrid larvæ, 141 leaf-hoppers, 112 young grasshoppers, 56 bugs, 42 spiders, 29 crickets, 10 moths, 5 ants, 4 scattering, and 29 times nothing was brought. 81 pieces were un-

identifiable. During the first three days the food consisted of Geometrid larvæ and leaf-hoppers, while the grasshoppers, crickets and ants were brought during the last two days.

It will thus be seen that with these three species of birds the preference of food for the young seems to be Geometrid larvæ. This may be partly due to the greater abundance of this food material as well as to the fact that these larvæ are about the right size for feeding birds the size of these, and that they are easily prepared for the young. One would expect the wrens to make use of smaller insects than the sparrows, and the large number of leaf-hoppers fed by them bears this out.

There was no evidence that any of these birds fed by regurgitation. In the case of the sparrows this was clearly proved, but what might have happened in the case of the wrens can only be surmised. At any rate, the food was uniformly brought dangling from the bill and was not swallowed before being delivered to the nestlings. This was the case with the very first feedings of both Song Sparrows and House Wrens.

Intensive studies of this sort are needed for all of our birds. It is not an exhausting sort of work, and pays large returns for the effort and time spent. Generalizations are in order only after a considerable number of nests of each species are studied, the nests under as different conditions of environment as possible. As one's experience in this work increases accuracy of observation increases.

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## PRELIMINARY LIST OF THE BIRDS OF NORTHERN PASSAIC COUNTY, NEW JERSEY.

BY LOUIS S. KOHLER. BLOOMFIELD, N. J.

In preparing the following list of birds, which the author has observed in Upper Passaic County, New Jersey, during the past ten years, all of the species have been included to which may be attached no doubt as to their identification or authenticity of record. The territory covered in these obser-